

Russia's Wheat Production and Trade: Recent Performance and Future Prospects

Michael Trueblood ¹

Abstract: At the time of reform, some economists thought Russia might switch from a net wheat importer to a net exporter, provided there were institutional and agricultural reforms that would increase productivity. However, this has not turned out to be the case. Several measures of productivity and efficiency have declined. Production efficiency on corporate farms fell within Russia for several reasons, including average farm size, self-sufficiency efforts, soft budget constraints, subsidiary private plot output, and marketing channels. A comparison of Russian wheat yields with those of other countries shows that the gap between Russia and other countries has widened in recent years.

Keywords: Russia, agricultural reform, transition economies, productivity, efficiency, convergence

Introduction

In the past, Russia was a major player in global food markets, in particular the wheat market. Russia's importance to global markets has declined in recent years, although the country still has the potential to affect world food prices, given its size and population (148 million people). Questions abound whether Russia can institute the reforms necessary to raise agricultural productivity and output, as well as create the institutional framework necessary for a well-functioning market-driven agricultural economy.

Prior to the reform period that began in 1992 (following the breakup of the former Soviet Union), Russia produced about 8 percent (44 million tons on average for 1989-91) of the world's wheat output. The country's volume of wheat imports accounted for almost 10 percent (11 million tons) of the world's wheat trade. Recently, Russia's wheat production has declined to the point that it only accounts for about 5.7 percent (34 million tons on average for 1997-99, although the last 2 years have been drought years) of global production. Imports have contracted sharply and now account for only 2.7 percent (3.4 million tons on average for 1997-99) of global trade.²

The changes in the Russian wheat market are part of the larger issue of economic reform. In general, Russia has cut

back on meat consumption as incomes have dropped and real food prices have risen. This has had a ripple effect, linking backward into the production system. Feed grain (including wheat) and livestock producers have been forced to cut back production. What has emerged recently in the consumer meat market are meat imports that compete with and substitute for meat that used to be produced domestically.

These changes can be explained by two key reforms. First, Russia engaged in price reform by eliminating both production subsidies and consumer subsidies. Removing production subsidies led to reduced output. Removing consumer subsidies led to reduced consumption. Second, trade reform added further pressure to production, as Russian producers have had to compete with international suppliers.

A key question of interest to policy makers that emerged early in the reform process—and is still critical today—was whether Russia would be able to raise its overall agricultural productivity. Early economic studies conducted after reform began forecast that Russia's agriculture would recover from its initial shock period within a few years and re-emerge on global markets as a potentially significant grain exporter.³ In retrospect, those early studies seem overly optimistic since they projected that productivity would increase as a result of real reform. Recent forecasts have projected that Russia's agricultural economy will remain stagnant and that the country will be a relatively minor importer on world agricultural markets.⁴

¹ Agricultural economist, Europe, Africa and Middle East Branch, Market and Trade Economics Division, ERS. David Sedik, Carlos Arnade, Gopinath Munisamy, Stefan Osborne, and William Liefert contributed to the research that is highlighted in this article.

² In contrast to most other countries, a large portion of wheat in Russia is fed to livestock. Higher grades of wheat are used for human consumption, while inferior grades are routinely fed to animals.

³ See Koopman (1991); Liefert, Koopman and Cook (1993); Johnson (1993); and Tyer (1994).

⁴ See Sedik, Liefert, and Liapis (1998).

This article reviews the overall agricultural reform situation in light of internal agricultural performance measurements. Then Russian wheat yields are compared with those of other countries for an external approach. Policy implications are discussed in the final section.

Overall Agricultural Performance and Reform in Russia

Recently, ERS has been examining Russia's agricultural performance in the reform era. The studies have reviewed the performance of large former state and collective farms, which are referred to as corporate farms in this article, since they continue to account for over 90 percent of all agricultural output.⁵ Data limitations have prevented detailed analysis of the wheat sector for the most part, but instead have focused on the crop sector overall. However, since wheat is one of the largest components of total output on a value basis, much of what is discussed below is directly applicable to wheat.

Several aspects of Russian efficiency and productivity have been examined by ERS, including production efficiency, market price responsiveness, yield performance, and overall agricultural productivity growth. Some of this research is still under review, but some has been formally published (Sedik, Trueblood and Arnade, 1999; Arnade and Munisamy, 2000). Much of this analysis can be viewed as reflecting on the overall effect of the reform process. Increasing efficiency or productivity indicators would suggest that reform has improved agricultural conditions and is having the desired effect, whereas decreasing indicators would suggest that conditions have deteriorated.

Each of the studies has found that the various measures of efficiency and productivity have declined during 1991-95, suggesting that reform has led to deteriorating conditions. For example, it was found that overall production efficiency declined; several crop yields, including wheat, have declined (more on this in the following section); pricing efficiency has declined; and overall productivity growth has declined.⁶

Consider one study that examined production efficiency (Sedik, Trueblood and Arnade, 1999). Production efficiency involves the physical relationship between output and input. Efficiency is usually measured on a percentage basis, so that a score of 0.70, for example, would mean that a farm should have been able to obtain 30 percent more output than it actually achieved, given input levels. Using two different and commonly accepted methodological approaches, it was

shown that production efficiency declined from an average of 0.91 to 0.76 during 1991-95. This means that for given input levels, corporate farms in Russia should have been able to obtain 9-24 percent more from their inputs. For example, in 1994, taking these measurements and assuming that they apply proportionally to the wheat sector, output could have been increased by 21 percent (from 33 to 40 million tons). Under these methodologies, the efficiency measurements are made only on the basis of best practice techniques within Russia; if it had been possible to compare across countries, it is very likely that the results would have been lower.

The study on production efficiency is particularly useful since it went a step further to quantify important institutional and economic factors that help explain why efficiency declined. Among some of the more important factors were:

- **Farm size.** Russian corporate farms on average are about six times larger than the largest farms in the United States. Regions with the largest farms tended to be less efficient, in part related to what appeared to be labor shortages. The interpretation would appear to be that there are limits to economies of scale, even in a land-rich country like Russia. An institutional reform that would help address this problem is land reform. This would not only allow producers to address the scale issue, but would be useful in the development of credit markets if land could be used as collateral. This in turn would help with investment and long run productivity. However, land reform legislation allowing private ownership has stalled in the Russian Parliament.
- **Self-sufficiency efforts.** Fear of food shortages has prompted many local officials and governments in Russia to pass laws that are clearly unconstitutional at the national level that prohibit agricultural outflows. This has encouraged self-sufficiency efforts by farm managers in each oblast and is reflected in high crop diversity measurements that were found to lead to production inefficiency. Production efficiency could be much improved if farms specialized in crops that are well suited to their regions and then traded with other regions.
- **"Soft budget constraints."** Farm managers continue to receive subsidies or debt forgiveness after unprofitable growing seasons, often referred to as the "soft budget constraint." Regions with the highest levels of subsidies were shown to be ones with the lowest efficiency levels. Until managers are held accountable for losses, the system will not be reformed.
- **Output of small private plots.** On the face of it, this factor might not appear that important. However, the study showed that in some regions, small private plot output rose while the corporate farm production efficiency levels declined, particularly in regions that had low efficiency levels at the beginning of reform. The interpretation

⁵ This includes output on subsidiary private plots that is tied to the corporate farms.

⁶ It should be noted that prior to reform, there were incentives for managers to overstate output, while the reverse is true today. However, misreporting is not considered to be a serious problem in the agricultural sector, where data for such items as area sown and yields are considered to be accurate.

would appear to be that workers took steps to ensure their personal survival while the corporate farms came under disrepair, or that workers contributed to the disrepair by pilfering supplies, a phenomenon that has been well documented in the past.

- **State marketing channels.** The study found that corporate farms that sent their output through the old official state market channels were actually more efficient. Developing additional market channels will take time and effort that might contribute to production inefficiency in the short run but lead to improvements in the long run.

Russian Wheat Yield Trend Analysis

Many of these problems are more evident when one examines yield trends in Russia. Recently, ERS has been examining yields for crops that are important to Russia, including wheat. The research has focused first on whether there has been yield convergence over time for the largest producers in the world, which would tend to indicate whether international agricultural technology has spread to other countries. The research then has specifically examined Russian yield trends in comparison to the world yield leaders. Highlights from this research are presented below.

One approach to testing for yield convergence is known as β -convergence.⁷ This measure refers to the parameter that is estimated from statistical linear regression analysis, that is, fitting a line through a group of observations. The intuition behind this approach is that laggard countries that start with relatively low yield levels would be converging (or catching up) to the leaders, which tend to grow more slowly when on or near the technological frontier, if the laggards display higher growth rates than the leaders.

Figure A-1 shows the trend line for wheat β -convergence. Globally, there is strong evidence that yields have converged for the top 25 producing countries. The linear regression model testing for β -convergence shows that the β coefficient is statistically significant with a sign that indicates that there has been convergence.

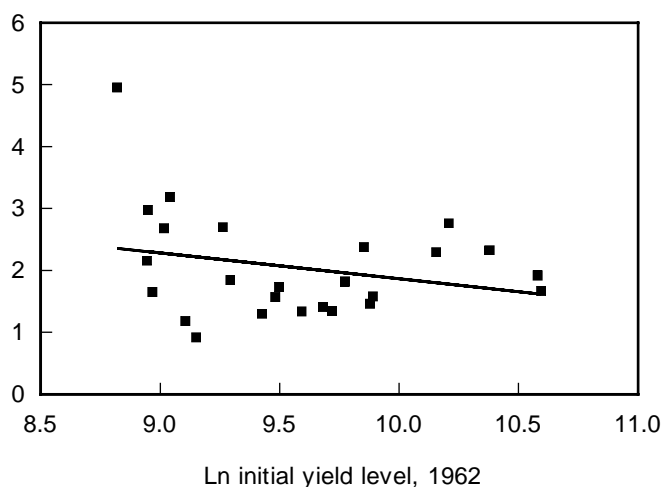
To understand how well Russia's yield trends performed in comparison to the leaders, its yields and growth trend were analyzed separately. Absolute yield differences between Russia and the global yield leaders were calculated for three time periods: the initial period, 1961-63; the period just prior to the Soviet breakup, 1989-91; and the most recent period for which data are available, 1996-98 (table A-1). In addition, growth rates were calculated to help gauge the

⁷ These approaches are borrowed from recent macroeconomic literature measuring convergence of per capita income levels across countries and have been used as a test to confirm or refute different types of growth models. An important part of this literature is trying to understand the role that technology and spillovers have in stimulating economic growth through education, research and development, and physical capital accumulation. The parallels to yield analysis are straightforward.

Figure A-1

Global wheat yield convergence, 1962-97

Ln growth rate, 1962-97



Source: Economic Research Service, USDA.

degree of yield convergence or divergence. The global yield leaders were selected on the basis of most recent period yields (1996-98 averages).⁸

Russia was slowly gaining ground on the global wheat yield leaders through the Soviet period, 1962-1990. However, after the reform period began, the wheat yield growth rate became negative (table A-1, seventh column). Given that the global wheat yield leaders continued to display positive growth rates, the gaps between these countries and Russia widened again (compare columns 1 and 3 in table A-1). In fact, the yield gap between Russia and the global yield leaders was wider in 1997 than it was in 1962. In short, the yield convergence gains that were achieved during 1962-1990 have completely evaporated. This pattern occurred not only for wheat, but also for most of the other crops that were examined (corn, rye, sugar beets, and sunflowers), reinforcing this finding.

Some might argue that it is inappropriate to compare Russia with other leading yield countries, such as those in Europe that have different resource endowments and climates, use intensive production practices, and are driven by strong policy incentives. To address this concern, Russian yields are compared with those of four other land-rich countries: Argentina, Australia, Canada, and the United States. The yield patterns are shown graphically in figure A-2, which displays yield trends in logarithms to emphasize the relative rates of growth. The figure shows that Russia was closing

⁸ For each commodity, the top five countries with the highest yields were selected and their yields averaged. In most cases, most of the five countries were also beginning period (1962) yield leaders as well.

Table A-1--Comparisons of Russian crop yields relative to world leaders

Table A-1--Comparisons of Russian crop yields relative to world leaders									
Commodity	Russian yields relative to top five			Yield growth rates				Conclusions	
	1962	1990	1997	Top five		Russia		1962-1990	1990-1997
				1961-91	1991-98	1961-91	1991-98	1990	1997
	----- Ratios -----			----- Percent per year -----					
Crop:									
Wheat	0.27	0.29	0.19	2.38	1.28	2.55	-4.28	N	D
Maize	0.53	0.42	0.22	2.87	2.95	2.02	-6.46	D	D
Rye	0.33	0.38	0.25	1.98	2.02	2.46	-4.01	C	D
Sugar beets	0.27	0.36	0.23	1.60	1.20	2.64	-5.53	C	D
Potatoes	0.35	0.29	0.25	1.39	2.57	0.79	0.41	D	D
Sunflowers	0.64	0.57	0.36	1.82	-1.27	1.36	-7.81	C	D

Conclusions key:

C - Converging or catching up.

D - Diverging or falling behind.

N - Neutral, kept pace.

Top five yield leaders selected for each crop based upon 1996-98 averages:

Wheat: United Kingdom, Germany, Denmark, France, Egypt.

Maize: Italy, Spain, France, Germany, United States.

Rye: Switzerland, United Kingdom, The Netherlands, Germany, Denmark.

Sugar beets: France, Switzerland, Belgium-Luxemburg, Chile, Austria.

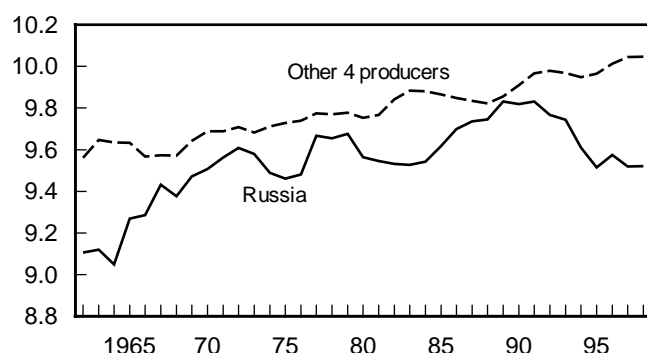
Potatoes: Belgium-Luxemburg, The Netherlands, United Kingdom, Germany, Denmark.

Sunflowers: Austria, France, Italy, Czechoslovakia (former), Argentina.

Figure A-2

Comparison of Russian yield trends with other major wheat producers with similar endowments

Kg/ha (in logarithms)



Data are 3 year center moving averages. Other 4 include Argentina, Australia, Canada, and United States.

Source: Foreign Agricultural Service, USDA.

the yield gap prior to reform. After reform, Russian wheat yields declined as yields in the other countries moved ahead.

It is not entirely clear why Russian yields have fallen in the reform period. However, one important explanation may be that Russian producers achieved the earlier yields by overusing fertilizers, which were heavily subsidized in the Soviet period. These subsidies have been removed in the reform era, leading to very high and sometimes unaffordable fertilizer prices and forcing farm managers to cope with alternative production practices. Other related factors also may

have had a cumulative impact on yields, including soil nutrient depletion as fertilizer use has dropped, increasing pest and weed problems from lack of plant protecting agents, and accelerated topsoil erosion. In addition, many of the institutional issues discussed previously probably were important contributing factors.

Conclusions

Nearly a decade has passed since Russia began its political, economic, and agricultural reforms. The primary agricultural reform question that arose back then is still with us to some extent today: will Russia be able to reform its agricultural system and raise overall productivity? Increasingly, the answer appears to be that this will not occur in the short or medium run. Several measures of efficiency and productivity for the early years of reform for which data are available suggest that conditions have worsened.

It is true that some studies use data that are only available through 1995 and have not allowed for a possible rebound effect. However, recent anecdotal evidence suggests that the situation is only getting worse. There have been several changes at the top of the Russian political leadership in recent years, adding to instability. There has been no significant legislation in recent years, such as concerning land reform or credit market development, that would promote agricultural reform.

The major implication from this analysis is that Russia's agricultural production may rebound some from drought in 1998 and 1999 but will remain mostly stagnant for the foreseeable future. This means that Russia is unlikely to be a major wheat exporter in the short or medium term. A more

likely outcome is that Russia will continue to import wheat, mostly from other countries of the former Soviet Union.

References

- Arnade, C. and G. Munisamy, "Financial Constraints and Output Targets in Russian Agricultural Production," *Journal of International Development* Vol. 12(2000): 71-84.
- Johnson, D. Gale. "Trade Effects of Dismantling the Socialized Agriculture of the Former Soviet Union," *Comparative Economic Studies*, Vol. 35(1993): 21-33.
- Koopman, Robert. "Agriculture's Role During the Transition from Plan to Market: Real Prices, Real Incentives, and Potential Equilibrium," in *Economic Statistics for Economies in Transition: Eastern Europe in the 1990's*. Washington, DC: U.S. Department of Labor, 1991, pp. 127-157.
- Liefert, W., D. Sedik, and E. Cook. "Agricultural Reform in the Former USSR," *Comparative Economic Studies* Vol. 35(1993): 49-69.
- Sedik, D., W. Liefert, and P. Liapis. "Economic Reform in the Newly Independent States of the Former USSR: Effects on Agricultural Production and Trade to 2005," in *Proceedings of a Conference of the International Agricultural Trade Research Consortium* (eds. H. von Witzke and S. Tangermann), Nov 1998: 210-231.
- Sedik, D., M. Trueblood and C. Arnade, "Corporate Farm Performance in Russia, 1991-95: An Efficiency Analysis," *Journal of Comparative Economics*, Vol. 27 (1999): 514-533.
- Tyer, R. *Economic Reform in Europe and the Former Soviet Union: Implications for International Food Markets*. Washington, DC: International Food Policy Research Institute, Report 99, 1994.